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A SUSTAINABLE DESIGN-ORIENTED PROCESS FOR CONVERTING AND SHARING KNOW-HOW

Emilio Rossi
Emilio Rossi Design Consulting; Via Venezia 4, 66026, Ortona (CH), Italy; erossidesign@gmail.com
Department of Architecture, University of Chieti-Pescara; Viale Pindaro 42, 65127 Pescara (PE), Italy

ABSTRACT

Explicit knowledge and tacit knowledge compose the Human Knowledge. While explicit knowledge refers to information sharable through communicative media (i.e. speech), tacit knowledge – also known as 'know-how' – is harder to be shared due to it is linked to experience mediated personal learning processes (i.e. learning by doing); moreover, know-how is useful to deal daily practical situations. This condition produces a dichotomy: people have know-how but they are unable to share what is mediated by their experience. Many studies evidence that know-how is a sustainable value that should be shared. While emerging opportunities arose from the last economic crisis have pointed out a large number of new chances for the use of know-how, there is a lack between the human sharing's will and the need of solutions to convert, share and learn know-how. This study proposes a design-oriented process for converting know-how, which can be applied to emerging and developing contexts, as well as to all issues concerning social innovation, inclusion and knowledge development.

Key Words: Know-How Sharing, Design-Oriented Process, Knowledge-Driven Sustainability, Communication.

1. INTRODUCTION

'Know-how' – also known as tacit knowledge – is a specific form of knowledge used by people to deal everyday situations that require the use of experiences, skills and practical abilities (Garud, 1997). Accordingly, know-how is a form of knowledge gettable only via direct exposition to factual events (i.e. playing piano, knot the shoelaces, etc.) and, as such, it is difficult to be shared at interpersonal level due to the experience-based acquisition is unstructured and mediated by personal learning processes and direct acquisition (i.e. learning by doing) (Storkerson, 2002).

Although know-how is characterized by an intrinsic complexity, at the general level it can be examined using two main analytical lenses, which help to understand potentialities and limitations. The first one is linked to the cognitive and communicative aspects. Know-how is the result of incessant learning processes and cognitive improvements that determine its intrinsic incommunicability (Polanyi, 1966); as know-how is acquired by direct exposition to events (i.e. observation of phenomena), the human cognition is not prepared to share it using traditional communicative media (i.e. speech), preferring other analogical ways of learning, such as: emulation, iteration, learning by doing, etc. The second one considers the role of know-how a form of economic asset, and its conversion into shareable value as a form of organizational competitiveness (Stevens, 2010). In this case, the Knowledge Management literature recognized the economic relevance of information sharing and many studies have documented the value of the communication and its potential during sharing activities (Nonaka, 1994).

In Design, only few studies have explored the value of know-how, and its implications in the increasing level of sustainability and social inclusion. In general, such studies have examined how know-how can be assumed as a design element in the productive contexts. Nevertheless, the analysis of literature in the area of Design for Sustainability shows that the issue of know-how sharing can meet many current research lines, such as: the creation of social innovation in rural and emerging economies, the inclusion of emarginated groups within social and productive networks (Leadbeather, 2008), the enhancement of degraded productive and residential places (Monteiro and Bartholo, 2008), the creation of hybrid networks for the exchange of self-produced goods (i.e.: reuse of craft-related skills), the creative learning aimed to the protection of threatened local heritage, the reinforcement of craft-based practices for new forms of collective wellbeing (Manzini and Jégou, 2003), the use of sustainable ways of thinking to link forms of production and knowledge sharing (Marano, 2010) and, finally, the use of Design to improve the level of 'sustainable' personal wellbeing (Nonaka and von Krogh, 2009).

Considering intrinsic complexities and design opportunities characterising the sharing of know-how, the issue of interpersonal communication is crucial to meet needs of communication expressed by people, with the chance of sustainable development that can be produced from them. This issue is also assumed as the most relevant, as well as it is one of the most difficult to be treated and implemented (Nonaka, 1994; Polanyi, 1966).

Within the current scenario of knowledge sharing's methods, it is believed that the creation of a new processes able to convert – in a unique 'flow' – the know-how into explicit knowledge learnable by all people, could be useful for all those situations where the use of human knowledge can help the development of sustainable forms of living, wellbeing and production, as well as to support the global transition toward the sustainable society (Rossi, 2014).

2. AIMS

This paper aims to propose a new sustainable design-oriented process for converting and sharing know-how. Starting from results developed within Knowledge Management domain, the proposed process explains the procedures needed to convert tacit knowledge (know-how) into explicit one and, then, how to design and develop a wide range of new products, services and design tools to make it shareable and learnable at interpersonal level.

While explicit knowledge is already a sustainable asset (i.e. shareable data), the main goal of this work is to make sustainable all other forms of knowledge owned by people, for whom there are not tools able to drive and support the conversion and the communication processes. As such, this work sustains a new idea of knowledge-driven sustainability and innovation (Rossi, 2014).

3. METHODOLOGY AND RESULTS

The sustainable design-oriented process for converting and sharing know-how has been developed using traditional Design Research's methods. In particular, the structure of this paper is divided in two main phases:

The first phases concerns the literature review; a detailed analysis of main references, theories, methods and tools concerning the sharing of know-how is used to know and understand the phenomenological aspects concerning the sharing of knowledge at interpersonal level, and their possible limitations (3.1. and 3.2.).

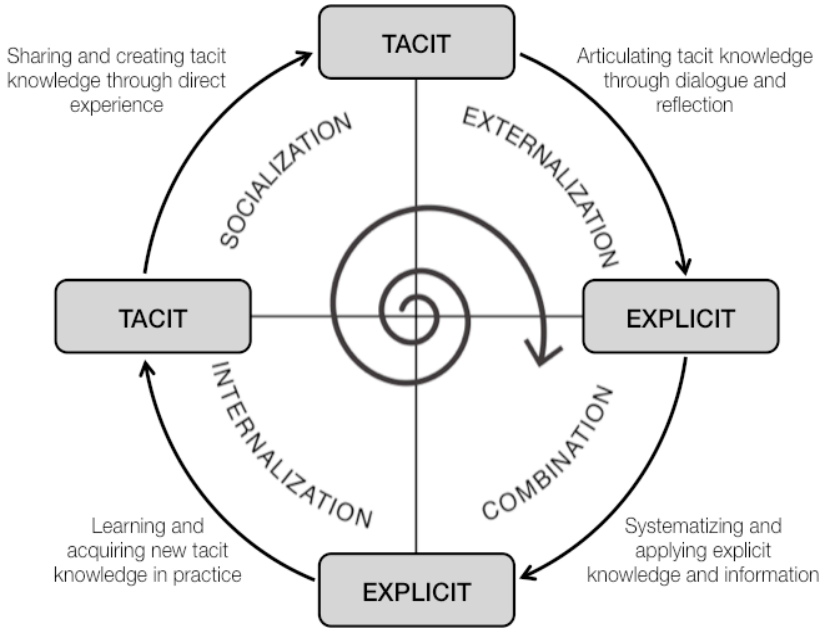
The second phase concerns the proposal of the sustainable design-oriented process for sharing know-how (3.3. and 3.4.). Here a new model has been developed and implemented for design-oriented applications.

3.1. Literature Review of Models and Tools for Sharing Know-How

While Design literature mainly focused the attention on the implications of explicit knowledge for new products and services development, in the field of Knowledge Management a number of theories, models and tools have

been conceived to describe the processes of knowledge sharing at interpersonal level.

In terms of models, one of the most important results developed in last thirty years is the SECI Model ('Socialization', 'Externalization', 'Combination' and 'Internalization') (Nonaka, 1994; Takeuchi, 1996) (Figure 1). According to Ikujiro Nonaka (1994), SECI's aim is to describe how the social dynamics working at the basis of the creation of knowledge in organizations are articulated; the model allows to understand what are the modalities that allow people to convert their knowledge from the incorporated form into the shareable one. Knowledge creation starts with 'Socialization', which is the process of converting new tacit knowledge through shared experiences in day-to- day social interaction; tacit knowledge is articulated into explicit knowledge through the process of 'Externalization' where it can be shared using concepts, images, and written documents; explicit knowledge is collected from inside or outside the organization and then combined, edited, or processed to form more complex and systematic explicit knowledge through the 'Combination' process; finally, explicit knowledge created and shared throughout an organization is converted into tacit knowledge by individuals through the 'Internalization' process, where knowledge is applied and used in practical situations and becomes the base for new routines.



[Figure 1] The SECI Model (Nonaka, 1994)

On the other hand, the literature showed the existence of an incredible number of tools and techniques that can be used to process knowledge at various levels (KST, 2012), which are classifiable for general purposes, for example: planning (i.e. SWOT Analysis), monitoring and evaluation (i.e. After Action Review), gathering of inputs (i.e. Discussion Forums, Photo Sharing, RSS), stakeholders' participation (i.e. Storytelling), support of communities and networks (i.e. Communities of Practices, Tagging and Social Bookmarking), collaborative actions (i.e. Brainstorming, Role Cards, Knowledge Fairs), meeting (i.e. Discussion Forums, Wikis, Mind Mapping), content sharing (i.e. CMSs, Photo Sharing, Community Interactive Theatres), advocating (i.e. Rural Radios), learning and training (Discussion Forums, Wikis, Group Facilitation, Peer Assists, Knowledge Fairs, Storytelling, Communities of Practice, Face-to-Face Meetings), and improvement of the impacts of knowledge (i.e. Leaning Alliances, Blogs).

However, none of them are fully able to manage the complexity of know-how sharing and, then, to address the development of design-oriented solutions for know-how sharing (Rossi, 2014); a new solution able to convert, in a unique iteration, know-how into explicit knowledge is needed and can be used for sustainable-oriented applications.

3.2. Limits of Current Models and Tools for Sharing Know-How

Even though SECI Model describes the process of knowledge conversion, it does not provide clear and detailed information about the specificity of each stage. In addition, it seems inapplicable for design implementations, design tools and collaborative networks – it is not conceived for them.

In the perspective of design-oriented applications, an additional analysis must be done on the communicative aspects of these methods and tools. The people's inability to properly express what they know generates additional considerations also on the social, cultural and economic points of view (Foray, 2004). The communicative problem underlines additional relevant issues about the phenomenological learning of the subjects to be shared, for example:

The 'proximity': the need to reduce the physical distance between who holds knowledge and who demands it (i.e. emulation through direct phenomenological observation).

The 'linguistic compatibility': the communicative, relational and socio-behavioral compatibility between who shares knowledge and who receives it (i.e. when people come from different cultures, ethnic groups or when they have very different social behaviors in learning and communication).

The 'differences': the anthropic, cognitive, attitudinal and interpretative diversities of stakeholders.

The 'protection of heritage and cultural identities': the need to protect traditions and rural specificities, which are passed down through iterative and emulative learning models based on practical knowledge.

The 'design of products and workplaces for the fulfillment of practical activities': the relation between people and the environment where the process of sharing is made.

However, the creation of a new design-oriented process for know-how sharing can start from the lesson developed by Nonaka and, then, from the its implementation with the results recently developed in other areas of Knowledge Management and Strategic Design Research, to integrate its idea and enable people to address the design on new knowledge-driven solutions

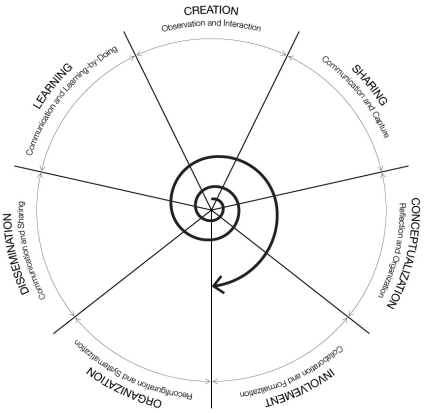
3.3. A New Process for Converting and Sharing Know-How

The new design-oriented process for converting and sharing know-how is based on the SECI Model. However, it has been said that SECI Model is a descriptive model and, therefore, it is not able to explain, in detail, all specific conversion phases needed for transforming know-how into sharable knowledge. Accordingly, it is necessary an early operation of transformation of the four SECI phases; this operation can be carried out from the analysis of the purposes contained into the Nonaka's studies (Nonaka, 1994; Nonaka and von Krogh, 2009). From the analysis of data belonging to the socio-organizational theory, it is possible to implement the four SECI phases in new seven sub-phases, which clarify the SECI's aims and allow to understand more in depth how each stage really works.

The structure of the new SECI-based process (Table 1 and Figure 2) shows the results of this process where to each SECI's phase a number of new sub-phases and related specific aims have been created in order to detail the information contained into literature with practical descriptions that will be useful during the design phase.

[Table 1] Structure of the new SECI-based process for converting and sharing know-how (Rossi, 2014)

SECI PHASES AND RELATED AIMS	NEW SECI-BASED PROCESS AND RELATED AIMS
SOCIALIZATION Phase 1: from Tacit Knowledge to Tacit Knowledge Aim: sharing notions and concepts	Sub-Phase 1: Tacit Knowledge Creation Aim: observation and interaction
	Sub-Phase 2: Tacit Knowledge Sharing Aim: communication and Capture
EXTERNALIZATION Phase 2: from Tacit Knowledge to Explicit Knowledge Aim: creating metaphors, analogies, concepts, hypothesis or models about notions and concepts	Sub-Phase 3: Tacit Knowledge Conceptualization Aim: reflection and organization
	Sub-Phase 4: Involvement (from Tacit Knowledge to Explicit Knowledge) Aim: collaboration and formalization
COMBINATION Phase 3: from Explicit Knowledge to Explicit Knowledge Aim: systematization of notions and concepts	Sub-Phase 5: Explicit Knowledge Organization Aim: reconfiguration and systematization
	Sub-Phase 6: Explicit Knowledge Dissemination Aim: communication and sharing
INTERNALIZATION Phase 4: from Explicit Knowledge to Tacit Knowledge Aim: translating and/or learning notions and concepts	Sub-Phase 7: Socialization and Learning (from Explicit Knowledge to Tacit Knowledge) Aim: communication and learning-by-doing



[Figure 2] Graphical representation of the new SECI-Based Model for converting and sharing know-how (Rossi, 2014)

For the purposes of this study, this result is relevant because it produces significant improvements, in particular:

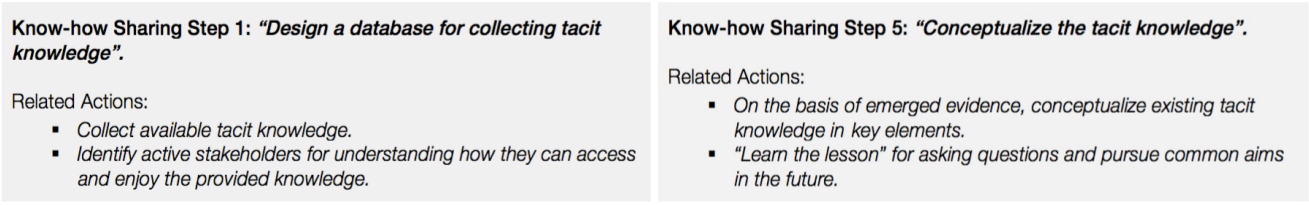
- It is coherent with with the communicative flows belonging to the human's knowledge communication.

- It is based on the communication processes used to share knowledge-based information, rather than on organizational and socio-behavioral ones.
- It introduces a number of focused suggestions about the nature of information, which are now less tied to the social sphere of the relational dynamics within organizations and more oriented toward the design domain, for further explorations and product-service developments.

3.4. Design-Oriented Characterization of the Process

The phase of design-oriented characterization, needed to convert the process into a communicative framework applicable to the design of communicative solutions for sharing know-how, has been done using twelve different methodologies and tools currently used in Knowledge Management (KST, 2012), but not yet applied in know-how sharing. These methodologies and tools are: After Action Review, Community Interactive Theater, Communities of Practice, Critical Moments of Reflection, Experience Capitalization, Good Practices, Knowledge Fairs, Mind Mapping, Most Significant Change, Peer Assists, River of Life, and Tagging / Social Bookmarking.

This interpolation allowed to identify twelve 'Know-how Sharing Steps' able to describe, with an high grade of accuracy, a devices-oriented design process for sharing know-how (Figure 3).



[Figure 3] Samples of 'Know-how Sharing Steps': 'Design a database for collecting tacit knowledge' (for Sub-Phase 1 – Tacit Knowledge Creation) (left) and 'Conceptualize the tacit knowledge' (for Sub-Phase 3 – Tacit Knowledge Conceptualization) (right) (Rossi, 2014)

5. CONCLUSIONS

As discussed, the problem of sharing of know-how offers the real opportunity to work on new and unexplored design issues, only marginally considered today. This claim reveals an immense potential, if we consider the positive effects that explicit knowledge and clear information have on the economic, technological and social dimensions.

The results here synthetically presented introduce a new design-oriented process for converting and sharing know-how at interpersonal level, composed by twelve 'Know-how Sharing Steps'. In the perspective of the transition toward the sustainable culture, know-how can surely play a new strategic role for extensive innovations, evolving the notion of skills from personal asset to collective and systemic intelligence. Accordingly, this work introduces a holistic process usable by all for the development of a wide range of solutions – products, services, product-service systems and design strategies – that can drive the exploration of knowledge-driven innovative innovations.

Moreover, this study shows a high impact on Sustainability because it proposes an original and easy-to-use process for convert, share and learn know-how, which can be applied to all emerging and developing contexts, as well as to all new issues concerning social innovation, social inclusion and sustainable economic development.

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